EPA Stakeholder Meeting

Development of Effluent Limitations Guidelines for the Iron and Steel Point Source Category

January 4, 2000

Washington, D.C.

Agenda

- Introduction and ground rules
- Subcategorization, applicability, and form of regulation under consideration
- Subcategory discussions (repeated for each subcategory)
  - Technology options under consideration
  - Model BAT flows and concentrations
  - Average pollutant concentrations from sampling episodes
- Best management practices
- Special regulatory provisions under consideration
- Costing approach and economic analyses
- Open forum

Candidate Subcategorization

SUBCATEGORY	SEGMENT	SUBSEGMENT
A. Cokemaking Operations	By-Product	
	Other - Nonrecovery	
B. Ironmaking Operations	Blast Furnaces	
	Sintering	
C. Integrated Steelmaking Operations	Basic Oxygen Furnaces	Wet - Open Combustion
		Wet - Suppressed Combustion
		Semi-Wet
	Vacuum Degassing	
	Continuous Casting	

Candidate Subcategorization, cont.

SUBCATEGORY	SEGMENT	SUBSEGMENT
D. Non-Integrated Steelmaking and Hot Forming Operations	Electric Arc Furnaces	Dry
		Semi-Wet
	Continuous Casting	
	Hot Forming	Section
		Flat
		Pipe & Tube
E. Integrated Hot Forming Operations, Stand-Alone Hot Forming Mills	Primary	Carbon and Specialty
	Section	Carbon and Specialty
	Flat	Carbon and Specialty
	Pipe & Tube	Carbon and Specialty

Candidate Subcategorization, cont.

SUBCATEGORY	SEGMENT	SUBSEGMENT
F. Steel Finishing Operations	Carbon Steel	Acid Pickling - Sulfuric Acid Pickling - Hydrochloric Cold Rolling - Recirculation Cold Rolling - Direct Application Cold Rolling - Combination Hot Dip Coating Electroplating Fume Scrubbers

Candidate Subcategorization, cont.

SUBCATEGORY	SEGMENT	SUBSEGMENT
F. Steel Finishing Operations, cont.	Specialty Steel	Descaling - Salt Bath Descaling - Electrolytic Sodium Sulfate Acid Pickling Cold Rolling - Recirculation Cold Rolling - Direct Application Cold Rolling - Combination Annealing Fume Scrubbers Other

Candidate Subcategorization, cont.

SUBCATEGORY	SEGMENT	SUBSEGMENT
G. Other Operations	Direct Iron Reduction	
	Iron Carbide	
	Briquetting (HBI)	
	Forging	
	Utility Operations	

Applicability

We anticipate that the following types of facilities will be regulated under the Iron and Steel Rule:

- Integrated steelmaking sites with and without cokemaking
- Stand-alone cokemaking sites
- Non-integrated steelmaking sites
- Stand-alone hot forming sites
- Stand-alone finishing sites (includes stand-alone continuous electroplating sites)
- Stand-alone continuous hot dip coating sites
- Stand-alone cold forming (sheet and strip) sites
- Stand-alone pipe and tube mills with hot forming

Applicability, cont.

We anticipate that the following types of facilities may be regulated under the Metal Products and Machinery (MPM) Rule:

- Stand-alone cold forming (bar) sites
- Stand-alone pipe and tube sites without hot forming
- Stand-alone wire sites
- Stand-alone batch hot dip coating sites
- Stand-alone batch electroplating sites

Form of Regulation

- Production-normalized mass effluent limitation guidelines for most subcategories as in current 40 CFR Part 420

- Possible production-normalized flow (PNF) and concentration tables in regulation for steel finishing operations and possibly other subcategories

Non-Integrated Steelmaking and Forming

- Carbon
  - Electric Arc Furnaces, Vacuum Degassing, Continuous Casting, Hot Forming
- Specialty
  - Electric Arc Furnaces, AOD, Vacuum Degassing, Continuous Casting, Hot Forming

Draft Technology Options for Non-Integrated Steelmaking - Electric Arc Furnace

Subsegment	Wastewater Treatment Operation	BAT-1	BAT-2
Dry air pollution control	N/A – Zero discharge	✓	✓
Semi-wet air pollution control	N/A – Zero discharge	✓	✓
Wet air pollution control	Coarse solids removal	✓	✓
	Sedimentation	✓	✓
	High-rate recycle with softening	✓	✓
	Blowdown Treatment	BAT-1	BAT-2
	Metals precipitation		✓
	Filtration		✓

Draft Technology Options for Non-Integrated Steelmaking -Vacuum Degassing

Wastewater Treatment Operation	BAT-1	BAT-2
Solids removal	✓	✓
Cooling tower	✓	✓
High-rate recycle	✓	✓
Blowdown Treatment	BAT-1	BAT-2
Metals precipitation		✓
Filtration		✓

Draft Technology Options for Non-Integrated Steelmaking - Continuous Casting

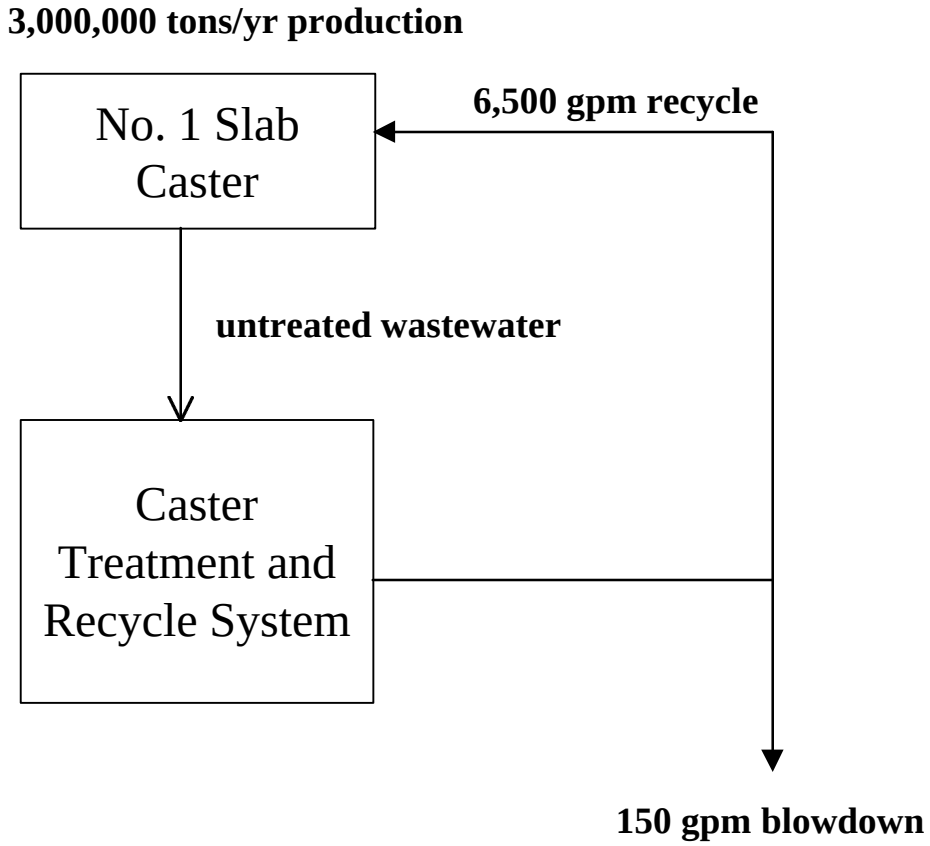
Wastewater Treatment Operation	BAT-1	BAT-2
Scale pit	✓	✓
Filtration	✓	✓
Cooling tower	✓	✓
High-rate recycle	✓	✓
Blowdown Treatment	BAT-1	BAT-2
Metals precipitation		✓
Filtration		✓

Draft Technology Options for Non-Integrated Steelmaking - Hot Forming

Wastewater Treatment Operation	BAT-1	BAT-2
Scale pit with oil removal (possible intermediate process oil removal)	✓	✓
Recycle flume flushing water	✓	✓
Roughing clarifier with oil removal	✓	✓
Media filtration	✓	✓
Cooling tower	✓	✓
High-rate recycle	✓	✓
Blowdown Treatment	BAT-1	BAT-2
Metals precipitation		✓
Filtration		✓

PNF Calculation Methodology

Example: Continuous Casting Treatment and Recycle System



PNF Calculation

$$\text{daily production} = \frac{3{,}000{,}000 \text{ tons/yr}}{365 \text{ days/yr}}$$

$$= 8{,}220 \text{ tons/day}$$

$$\text{PNF} = \frac{150 \text{ gal/min} \times 1{,}440 \text{ min/day}}{8{,}220 \text{ tons/day}}$$

= 26 gal/ton

Source: **Production rates, flow rates, and operating schedules were obtained from the US EPA Collection of 1997 Iron and Steel Industry Data**

Reported PNF Summary Continuous Casting

- 13 non-integrated sites with continuous casting evaluated to date
  - 17 continuous casters
    - 11 billet casters
    - 4 bloom casters
    - 2 thin slab casters

- 1982 Model BAT PNF = 25 GPT

Sources: US EPA Collection of 1997 Iron & Steel Industry Data and 1982 US EPA Development Document

1997 Reported Continuous Casting PNFs (GPT)

- 0
- 0
- 0
- 0
- 0
- 3
- 6
- 9 ↯
- 10 ⊡ (median)
- 10 ⊡
- 11 ↯
- 12
- 16
- 29
- 35 ↯
- 108
- 123 ↯

↯ Bloom casting

⊡ Thin slab casting

All other values represent billet casting

Source: US EPA Collection of 1997 Iron & Steel Industry Data

Reported PNF Summary for Hot Forming

- 16 non-integrated sites with hot forming operations evaluated to date
  - 18 hot forming mills
    - 7 strip or plate mills
    - 5 beam mills
    - 5 rod mills
    - 1 section mill

Source: US EPA Collection of 1997 Iron & Steel Industry Data

Reported PNF Summary for Hot Forming, cont.

- 1982 Model BAT/NSPS PNFs
  - Flat mill
    - Hot strip and sheet = 260 GPT
    - Carbon plate = 140 GPT
    - Specialty plate = 60 GPT

Source: 1982 US EPA Development Document

Reported PNF Summary for Hot Forming, cont.

- Primary mill
  - with scarfers = 140 GPT
  - without scarfers = 90 GPT
- Section mill
  - Carbon = 200 GPT
  - Specialty = 130 GPT
- Pipe and tube mill
  - 220 GPT

Source: 1982 US EPA Development Document

1997 Reported Hot Forming PNFs (GPT)

Strip or Plate Mills	Beam Mills	Rod Mills	Section Mills
0	0	2	25
0	2	5	
0	9 (median)	69 (median)	
25 (median)	11	140	
34	31	192	
35			
127			

Source: US EPA Collection of 1997 Iron & Steel Industry Data

Mean Hexavalent Chromium Concentrations in Untreated Wastewater Non-Integrated Steelmaking and Hot Forming Subcategory

Segment	Site	Mean Hexavalent Chromium Concentration* (mg/L)	Number of Detects/ Number of Samples
Continuous Casting	A	0.31	4/4
	B	0.053	4/6
Hot Forming - Flat	C	0.023	4/6

*To calculate mean concentrations, sample detection limits were used as the sample concentration for nondetected samples.

Source: US EPA sampling data 1997-1999

Dissolved and Total Metals Effluent Data Non-Integrated Steelmaking and Hot Forming Operations

Pollutant	Mean Effluent Pollutant Concentrations* (mg/L)						Number of Detects/ Number of Samples
	Specialty Steel				Carbon Steel		
	Continous Casting		Hot Forming - Flat		Continous Casting	Hot Forming - Flat	
	Site A	Site B	Site C	Site D	Site E	Site F	
Chromium	0.53	0.31	0.022	0.29	0.001	0.004	21/22
Chromium, Dissolved	0.46	0.059	0.004	0.002	0.001	0.001	17/22
Copper	0.067	0.054	0.009	0.29	0.011	0.011	17/22
Copper, Dissolved	0.032	0.009	0.009	0.009	0.011	0.011	5/22
Iron	3.7	5.4	0.6	9.3	0.5	8.4	22/22
Iron, Dissolved	0.032	0.011	0.082	0.18	0.033	0.04	13/22
Lead	0.002	0.002	0.002	0.002	0.002	0.002	1/22
Lead, Dissolved	0.002	0.002	0.002	0.002	0.002	0.002	0/22
Nickel	0.42	0.3	0.04	3	0.028	0.028	18/22
Nickel, Dissolved	0.13	0.14	0.03	0.87	0.028	0.028	19/22
Zinc	0.01	0.072	0.069	9.5	0.026	0.014	17/22
Zinc, Dissolved	0.01	0.01	0.055	5.4	0.014	0.016	10/22

*To calculate mean concentrations, sample detection limits were used as the sample concentration for nondetected samples.

Source: US EPA sampling data 1997-1999

Mean Effluent Pollutant Concentrations
Non-Integrated Steelmaking and Hot Forming Subcategory

Pollutants Under Consideration for Regulation	Mean Effluent Pollutant Concentration[a] (mg/L)					Number of Detects/Number of Samples
	Hot Forming		Continuous Casting			
	Site A (specialty)	Site B (carbon)	Site C (carbon)	Site D (specialty)	Site E (specialty)	
Total Suspended Solids[b]	6.8	11	4	17	17	19/22
Oil and Grease[b] (measured as HEM)	8.9	5	5	5.6	5.8	8/22
pH[b] (SU)	7.2	8.1	8.4	8	8	Not applicable
Chromium	0.022	0.004	0.001	0.53	0.31	21/22
Lead[b]	0.002	0.002	0.002	0.002	0.002	1/22
Nickel	0.04	0.028	0.028	0.42	0.3	18/22
Zinc[b]	0.069	0.014	0.026	0.01	0.072	17/22

[a]To calculate mean concentrations, sample detection limits were used as the sample concentration for nondetected samples.

[b]Regulated pollutants in 40 CFR Part 420.

Source: US EPA sampling data 1997-1999

Dissolved and Total Metals Effluent Concentrations Integrated Steelmaking and Hot Forming Operations - Carbon Steel

Pollutant	Mean Effluent Pollutant Concentrations* (mg/L)			Number of Detects/ Number of Samples
	Continuous Casting	Hot Forming - Flat		
	Site A	Site B	Site C	
Chromium	0.008	0.002	0.006	12/15
Chromium, Dissolved	0.003	0.001	0.001	4/15
Copper	0.016	0.009	0.009	1/15
Copper, Dissolved	0.031	0.009	0.009	1/15
Iron	4.9	2.6	11	15/15
Iron, Dissolved	1.9	0.26	0.08	12/15
Lead	0.019	0.005	0.002	10/15
Lead, Dissolved	0.005	0.002	0.002	3/15
Nickel	0.02	0.02	0.028	5/15
Nickel, Dissolved	0.02	0.02	0.021	3/15
Zinc	0.23	0.074	0.037	15/15
Zinc, Dissolved	0.056	0.029	0.016	12/15

*To calculate mean concentrations, sample detection limits were used as the sample concentration for nondetected samples.

Source: US EPA sampling data 1997-1999

Mean Effluent Pollutant Concentrations Integrated and Stand-Alone Hot Forming Subcategory

Pollutants Under Consideration for Regulation	Mean Effluent Pollutant Concentration[a] (mg/L)				Number of Detects/ Number of Samples
	Flat Mill				
	Site A	Site B	Site C	Site D	
Total Suspended Solids[b]	13	---	---	6.3	3/7
Oil and Grease[b] (measured as HEM)	6.5	---	---	6.6	5/7
pH[b] (SU)	7.8	---	---	8	Not applicable
Chromium	0.002	0.006	0.002	0.011	9/17
Lead[b]	0.019	0.002	0.005	0.005	8/17
Nickel	0.005	0.028	0.02	0.037	9/17
Zinc[b]	0.003	0.037	0.074	0.17	14/17

[a]To calculate mean concentrations, sample detection limits were used as the sample concentration for nondetected samples.

[b]Regulated pollutants in 40 CFR Part 420.

All data represent carbon hot forming operations

Source: US EPA sampling data 1997-1999

Steel Finishing

- Carbon
  - Acid Pickling, Cold Rolling and Annealing, Alkaline Cleaning, Hot Dip Coating, Electroplating, Other
- Specialty
  - Salt Bath Descaling, ESS Descaling, Acid Pickling, Cold Rolling and Annealing, Alkaline Cleaning, Other

*Draft Technology Options for Steel Finishing Operations: Process Controls**

Type of Steel	Subsegment	Process Control
Carbon Steel	Acid Pickling	Counter-current rinsing; recycle of fume scrubber water; indirect/direct heating of acid baths; acid regeneration
	Alkaline Cleaning	Same as Acid Pickling where applicable
	Cold Rolling	In-line treatment and reuse of rolling solutions
	Hot Dip Coating	Same as Acid Pickling
	Electroplating	Same as Acid Pickling where applicable; recovery of plating solutions; recovery of hexavalent chromium solutions
Alloy and Specialty Steel	Descaling	Indirect cooling and recycle of quench water
	Acid Pickling	Same as Acid Pickling for Carbon Steel; acid purification
	Alkaline Cleaning	Same as Acid Pickling where applicable
	Cold Rolling	Same as Cold Rolling for Carbon Steel

* Process Controls apply to BAT-1 and BAT-2

Draft Technology Options for Steel Finishing Operations: End-of-Pipe Treatment for both Carbon and Specialty Steel

Wastewater Treatment Operation	BAT-1	BAT-2
Diversion tanks (for process line and treatment system)	✓	✓
Oil removal	✓	✓
Hexavalent chromium reduction	✓	✓
Hydraulic and waste loading equalization	✓	✓
Multiple-stage pH control for metals precipitation	✓	✓
Sedimentation and sludge dewatering	✓	✓
Filtration		✓

Example ELG Structure
Steel Finishing - Carbon Steel Segment

Pollutant	Monthly Avg (mg/L)	Daily Max (mg/L)
TSS	x	y
O&G	x	y
Chromium	x	y
Copper	x	y
Lead	x	y
Nickel	x	y
Zinc	x	y

Segment	PNF (GPT)
Acid Pickling - HCl	10
Cold Rolling - Recirculation (multiple stand)	25
Hot Dip Coating	600
Continuous Alkaline Cleaning	250
Fume Scrubber	15 gpm

Source: 1982 US EPA Development Document

Example ELG Structure
Steel Finishing - Specialty Steel Segment

Pollutant	Monthly Avg (mg/L)	Daily Max (mg/L)
TSS	x	y
O&G	x	y
Chromium	x	y
Copper	x	y
Lead	x	y
Nickel	x	y
Zinc	x	y

Segment	PNF (GPT)
Acid Pickling - HCl	10
Cold Rolling - Recirculation (multiple stand)	25
Continuous Alkaline Cleaning	250
Fume Scrubber	15 gpm

Source: 1982 US EPA Development Document

Steel Finishing at Integrated Sites

Production-Normalized Flow Summary

Reported PNF Summary for Cold Forming

- 19 integrated sites with cold forming operations
  - 18 sites perform cold rolling (59 mills)
    - 35 multi-stand mills
      - 12 direct application systems
      - 11 recirculation systems
      - 8 combination systems
      - 3 zero discharge systems

Source: US EPA Collection of 1997 Iron & Steel Industry Data

Reported PNF Summary for Cold Forming, cont.

- 24 single-stand mills
  - 20 direct application systems
  - 1 recirculation system
  - 3 zero discharge systems
- 1 site performs electric-resistance welding (ERW) pipe operations

Source: US EPA Collection of 1997 Iron & Steel Industry Data

Reported PNF Summary for Cold Forming, cont.

- 1982 Model BAT/PSNS PNFs:
  - Multi-Stand
    - Direct application = 400 GPT
    - Recirculation = 25 GPT
    - Combination = 300 GPT
  - Single stand
    - Direct application = 90 GPT
    - Recirculation = 5 GPT

Source: 1982 US EPA Development Document

1997 Reported Cold Rolling PNFs (GPT)

Multi-Stand Direct Application	Multi-Stand Recirculation	Multi-Stand Combination	Single-Stand Direct Application		Single-Stand Recirculation
0.7	0.5	31	0	3	3
2	0.7	48	0	4	
12	10	91	0	5	
165	10	143 (median)	0	7	
233	14	195 (median)	0.4	7	
322 (median)	28 (median)	201	0.7	32	
333 (median)	37	319	0.9	70	
546	73	666	0.9	360	
1,119	168		1		
1,846	502		1 (median)		
1,975	1,237		2 (median)		
5,856			2		

Source: US EPA Collection of 1997 Iron & Steel Industry Data

Steel Finishing at Non-Integrated Sites

Production-Normalized Flow Summary

Reported PNF Summary for Cold Forming

- 10 non-integrated sites with cold forming operations evaluated to date
  - 5 Z-mills
  - 1 ERW mill (recirculation system)
    - Zero discharge - contract haul blowdown
  - 1 multi-stand mill
    - No water applied

Source: US EPA Collection of 1997 Iron & Steel Industry Data

Reported PNF Summary for Cold Forming, cont.

- 10 single-stand mills
  - 7 recirculation systems
  - 2 direct application systems
  - 1 mill applies no water

Source: US EPA Collection of 1997 Iron & Steel Industry Data

Reported PNF Summary for Cold Forming, cont.

- 1982 Model BAT/PSNS PNFs:
  - Multi-Stand
    - Direct application = 400 GPT
    - Recirculation = 25 GPT
    - Combination = 300 GPT
  - Single stand
    - Direct application = 90 GPT
    - Recirculation = 5 GPT

Source: 1982 US EPA Development Document

1997 Reported Cold Rolling PNFs (GPT)

Single-Stand Direct Application	Single-Stand Recirculation
0	0.1
35	0.3
	0.7 (median)
	0.8 (median)
	30
	97

Source: US EPA Collection of 1997 Iron & Steel Industry Data

Steel Finishing at Integrated, Non-Integrated, and Stand-Alone Sites

Analytical Data Summary (Combined)

Hexavalent Chromium Pretreatment System Data Carbon and Specialty Steel Finishing Sites

Site	Subcategory/Subsegment	Mean Hexavalent Chromium Concentration*		% Removal
		Influent (mg/L)	Effluent (mg/L)	
A	Carbon Finishing/ Galvanizing, Electroplating	16	0.025	99.8%
B	Carbon Finishing/ Galvanizing, Electroplating	17	0.02	99.9%
C	Specialty Finishing/ Descaling (ESS)	30	0.16	99.5%
D	Specialty Finishing/ Descaling (Salt Bath)	2.1	0.01	99.5%

*To calculate mean concentrations, sample detection limits were used as the sample concentration for nondetected samples.

Source: US EPA sampling data 1997-1999

Mean Hexavalent Chromium Concentrations in Untreated Wastewater Steel Finishing Subcategory – Carbon Steel Segment

Subsegment	Site	Mean Hexavalent Chromium Concentration* (mg/L)	Number of Detects/ Number of Samples
Acid Pickling	A	0.013	2/3
Hot Dip Coating	B	16	1/1
Electroplating	C	0.01	0/3
	D	0.011	1/3
	E	0.012	1/3
	F	16	3/3

*To calculate mean concentrations, sample detection limits were used as the sample concentration for nondetected samples.

Source: US EPA sampling data 1997-1999

Mean Hexavalent Chromium Concentrations in Untreated Wastewater Steel Finishing Subcategory – Specialty Steel Segment

Subsegment	Site	Mean Hexavalent Chromium Concentration* (mg/L)	Number of Detects/ Number of Samples
Acid Pickling	A	0.011	1/5
Descaling - ESS	B	30	2/2
Descaling - Salt Bath	C	2.1	2/5
Cold Rolling	D	0.1	1/5
	E	0.025	1/5

*To calculate mean concentrations, sample detection limits were used as the sample concentration for nondetected samples.

Source: US EPA sampling data 1997-1999

Mean Effluent Pollutant Concentrations
Steel Finishing Subcategory – Carbon Steel Segment

Pollutants Under Consideration for Regulation	Mean Effluent Pollutant Concentration[a] (mg/L)						Number of Detects/ Number of Samples
	Cold Forming	Electroplating	Combined Finishing				
	Site A	Site B	Site C	Site D	Site E	Site F	
Total Suspended Solids[b]	10	6.9	4.3	14	6.1	17	23/29
Oil and Grease[b] (measured as HEM)	10	5.6	6	6.4	6.6	11	18/29
pH[b] (SU)	7	8.9	7.9	6.9	8.1	7.1	Not applicable
Total Chromium	0.01	0.01	0.011	0.01	0.009	0.01	7/29
Chromium, Hexavalent[b]	---	---	0.02	0.01	0.01	---	2/15
Lead[b]	0.003	0.002	0.002	0.003	0.002	0.002	5/29
Nickel	0.024	0.17	0.048	0.017	0.027	0.017	18/29
Zinc[b]	0.19	0.096	0.011	0.29	0.041	0.015	26/29
Naphthalene[b]	0.01	0.061	0.01	0.01	0.01	0.01	0/21
Tetrachloroethene[b]	0.01	0.008	0.01	0.01	0.01	0.01	0/20

[a]To calculate mean concentrations, sample detection limits were used as the sample concentration for nondetected samples.

[b]Regulated pollutants in 40 CFR Part 420.

Source: US EPA sampling data 1997-1999

Mean Effluent Pollutant Concentrations
Steel Finishing Subcategory – Specialty Steel Segment

Pollutants Under Consideration for Regulation	Mean Effluent Pollutant Concentration[a] (mg/L)			Number of Detects/ Number of Samples
	Combined Finishing			
	Site A	Site B	Site C	
Total Suspended Solids[b]	33	23	4	10/15
Oil and Grease[b] (measured as HEM)	7.9	7.9	6.2	3/15
Ammonia as Nitrogen	42	22	1.8	15/15
Nitrate/Nitrite	520	900	99	15/15
pH[b] (SU)	8.9	8.7	7.3	Not applicable
Chromium	0.06	0.18	0.13	15/15
Chromium, Hexavalent[b]	0.01	0.05	0.12	10/15
Lead	0.002	0.002	0.002	0/15
Nickel	0.28	0.14	0.029	11/15
Zinc	0.009	0.009	0.006	4/15
Naphthalene[b]	0.01	0.01	0.025	0/13
Tetrachloroethene[b]	0.01	0.01	0.01	0/13

[a]To calculate mean concentrations, sample detection limits were used as the sample concentration for nondetected samples.

[b]Regulated pollutants in 40 CFR Part 420.

Source: US EPA sampling data 1997-1999

Carbon Finishing Model Concentrations

Pollutant (mg/L)	1982 Range	Site A	Site B	Site C	Site D	Site E	Site F
TSS*	5-33	8.8	10.7	4.1	3.7	4.5	7.7
O&G (HEM)*		5.6	3.1	2.8	3.1		
pH*				8.2	7.5		
Lead*	0.02-0.05	0.005	<0.002	0.05	0.003	0.023	
Zinc*	0.04-0.13	0.05	0.02	0.05	0.25	0.07	0.71
Hexavalent chromium*				0.01			
Tetrachloroethene*		0.001		0.005			
Naphthalene*		0.001		0.01			
Chromium	0.02-0.04	0.032		0.1			
Nickel	0.03					0.004	0.04

* Regulated pollutants in 40 CFR Part 420

Sources: 1982 US EPA Development Document and industry-supplied 1997 compliance data

Specialty Finishing Model Concentrations

Pollutant (mg/L)	1982 LTAs	Site A	Site B
TSS*	23.8	12.3	7.7
O&G (HEM)	4.4		1.34
pH	6-9		8.3
Hexavalent chromium	0.05	0.03	0.02
Chromium*	0.28	0.11	0.19
Nickel*	0.25	0.07	0.32

* Regulated pollutants in 40 CFR Part 420

Sources: 1982 US EPA Development Document and industry-supplied 1997 compliance data

Other Operations

- Direct-Reduced Ironmaking
- Briquetting
- Forging
- Utilities
- Other

Mean Effluent Pollutant Concentrations
Other Subcategory – Direct Reduced Ironmaking Segment

Pollutants Under Consideration for Regulation	Mean Effluent Pollutant Concentration[a] (mg/L)	Number of Detects/ Number of Samples
	Direct Iron Reduction	
	Site A	
Total Suspended Solids	4	0/1
Oil and Grease (measured as HEM)	5	0/1
Ammonia as Nitrogen	13	1/1
Total Recoverable Phenolics	0.018	1/1
pH[b] (SU)	7.3	Not applicable
Total Chromium	0.001	0/1
Copper	0.011	0/1
Lead	0.002	0/1
Nickel	0.028	0/1
Zinc	0.014	0/1

[a]To calculate mean concentrations, sample detection limits were used as the sample concentration for nondetected samples.

Source: US EPA sampling data 1997-1999

Draft Best Management Practices

Subcategory	BMPs
Cokemaking	1. Noncontact cooling water monitor and repair programs
Ironmaking	1. Secure slag pits 2. Noncontact cooling water monitor and repair programs
Integrated Steelmaking Operations	1. Cascade of blowdowns from Continuous Caster and Vacuum Degassing to BOF
Integrated Hot Forming Operations and Stand-Alone Hot Forming Mills	1. Oil maintenance/management programs on mills
Non-Integrated Steelmaking and Hot Forming Operations	1. Oil maintenance/management programs on mills
Steel Finishing Operations	TBD
Other Operations	TBD

Special Regulatory Provisions Under Consideration

- Internal pH limitations
- Production basis for NPDES and Pretreatment Permits
- Phenol/Ammonia limits at POTWs with nitrification
- Consideration of
  - Storm water
  - Ground water
  - Basement sumps
  - Equipment cleaning and washdown water
  - Utilities

Costing Approach

Determination of Costs for the Iron and Steel Point Source Category

Types of Capital Cost Estimates

- Order-of-Magnitude (Ratio) Estimate: rule-of-thumb method based on cost data for similar types of projects (+/- 10 to 50%)
- Study (Factored) Estimate: requires knowledge of major equipment items; used for feasibility surveys (+/- 30%)
- Preliminary (Budget Authorization) Estimate: requires more detailed site-specific information than study estimate (+/- 20%)
- Definitive (Project Control) Estimate: based on considerable data prior to completion of final drawings and specifications (+/- 10%)
- Detailed (Firm or Contractor) Estimate: requires completed drawings, specifications, and site surveys (+/- 5%)

Source: Perry's Chemical Engineers' Handbook, 6th edition

Costing Approach

- Incremental capital costs (large recycle system projects)
  - Major equipment (vendor quotes)
  - Installation (estimate performed for each project)
    - Mechanical equipment installation
    - Piping installation
    - Civil/Structural (site preparation/grading, foundations, etc.)
    - Electrical and process control
  - Indirect costs (factors developed from actual projects)
    - Temporary facilities
    - Spare parts
    - Engineering procurement and contract management
    - Other
  - Contingency

Costing Approach

- Incremental Capital Costs (specific treatment units and blowdown treatments)
  - Major equipment (industry capital cost data, vendor quotes)
  - Consultant costs (one-time, non-capital costs)
  - Installation (factors developed from actual projects)
    - Mechanical equipment installation
    - Piping installation
    - Civil/Structural (site preparation/grading, foundations, etc.)
    - Electrical and process control
  - Indirect costs (factors developed from actual projects)
    - Temporary facilities
    - Spare parts
    - Engineering procurement and contract management
    - Other
  - Contingency

Costing Approach

- Incremental operating and maintenance costs
  - Labor (operating and maintenance)
  - Maintenance (materials and vendors)
  - Chemical costs
  - Energy costs
  - Steam costs
  - Sludge/Residuals disposal costs (hazardous/nonhazardous)
  - Oil disposal costs
  - Sampling/monitoring costs

Economic Analyses

- Cost annualization
- Cost-effectiveness
- Industry profile
- Facility financial analysis (closure model)
- Company financial distress
- Market model (industry-wide impacts)
- Secondary impacts (national level)
- Regulatory Flexibility Analysis/
  Small Business Regulatory Enforcement Flexibility Act
- Unfunded Mandates Reform Act
- Executive Order 12898 - Environmental Justice
- Executive Order 12866 - Cost/Benefit
- Executive Order 13045 - Protection of Children from Environmental Health Risks